REMARKS/ARGUMENTS

The Examiner is thanked for the Office Action mailed April 15, 2008 The status of the application is as follows:

- Claims 1-22 are pending, claims 1-3, 5-13, and 19-22 have been amended;
- The specification is objected to for informalities;
- Claims 1, 3 and 13-20 are rejected under 35 U.S.C 102(b) as being anticipated by Richardson et al. (US 2002/0146092 A1);
- Claims 2, 4-10 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson et al in view of Walton et al. (US 2005/0159735 A1); and
- Claims 11-12 are rejected under 35 U S C. 103(a) as being unpatentable over Richardson et al.

The objections and rejections are discussed below

The Objection to the Specification

The specification is objected to for informalities. Particularly, the Office contends that headings for each section of the specification is missing However, the subject headings are not required, but only suggested See MPEP §608.01(a). Accordingly, the foregoing objection is moot.

The Rejection of Claims 1, 3 and 13-20 under 35 U.S.C. 102(b)

Claims 1, 3 and 13-20 stand rejected under 35 U.S.C. 102(b) as being anticipated by Richardson et al This rejection should be withdrawn because Richardson et al. does not teach each and every element as set forth in the subject claims and, therefore, does not anticipate claims 1, 3 and 13-20.

> A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir 1987). MPEP §2131

Independent claim 1 is directed to an assembly which includes an X-ray tube and a cooling system for cooling the X-ray tube. Claim 1 requires, *inter alia*, a cooling system including a pump and a flow sensor system which is responsive to a pressure difference across the pump. Richardson et al does not teach or suggest these claim aspects.

Richardson et al. discloses a cooling system 300 for use with high-power x-ray tubes. The cooling system 300 includes a circulating pump 306 that serves to circulate a first coolant 304 throughout a housing 202 (see ¶ [0049]; Fig. 3). By inducing motion on the first coolant 304, circulating pump 306 introduces a forced convective cooling effect provided by virtue of the substantial contact between first coolant 304 and electrical components including x-ray tube 200. The cooling system 300 also includes a second coolant 314, coolant pump 308, a heat exchange means such as a radiator 310, and a means for regulating pressure, such as an accumulator 500 (see ¶¶ [0050] and [0051]; Fig. 3). As the second coolant 314 circulates and absorbs heat from the x-ray tube structures and the first coolant 304, the temperature of the second coolant 314, and thus its volume, increases (see ¶ [0072]; Fig 5A). The accumulator 500 provides a space which serves to accommodate the increase in second coolant 314 volume due to increased temperature (see ¶ [0025]). The accumulator 500 permits the pressure in the second coolant system to reach a predetermined point, and then maintains the pressure of the second coolant 314 at that point (see ¶ [0025]).

The accumulator 500 includes an accumulator housing 502, end wall 504, and vent 504A (see ¶ [0071]; Fig. 5A). Disposed within accumulator housing 502 is a diaphragm bellows 508, the edge of which is secured to accumulator housing 502 and end wall 504, thereby defining a chamber 506 (see ¶ [0071]; Fig. 5A) A pressure relief valve 510 and check valve 512, preferably mounted to accumulator housing 502, are in fluid communication with chamber 506 (see ¶ [0071]; Fig. 5A) The pressure relief valve 510 and check valve 512 are in fluid communication with the inlet of coolant pump 308 (see ¶ [0071]; Fig 5A). As second coolant 314 circulates and absorbs heat from x-ray tube 200 and first coolant 304, the pressure and temperature of second coolant 314 increases (see ¶ [0072] When the pressure of second coolant 314 reaches a set pressure, pressure relief valve 510 opens and admits an amount of second coolant 314 into accumulation chamber 506 of accumulator 500 (see ¶ [0072]). As the volume of second coolant 314 continues to increase, in response to continued absorption of heat

dissipated by x-ray tube 200, second coolant 314 continues to enter chamber 306 through relief valve 510, gradually forcing diaphragm bellows 508 towards end wall 504 (see ¶ [0072]).

The Office asserts that the accumulator 500 is a flow sensor system which is responsive to a pressure difference across the pump (see ¶¶ [0045] and [0072]). However, in view of the foregoing, it is readily apparent that the accumulator 500 is not responsive to a pressure difference across the pump as is required by claim 1. As previously discussed, the pressure relief valve 510 and check valve 512 are in fluid communication with chamber 506 of accumulator 500 and the inlet of coolant pump 308. The accumulator 500 is not in fluid communication with the outlet of coolant pump 308. Thus, the accumulator 500 is responsive only to the pressure of the second coolant 314 at the inlet of coolant pump 308. Stated differently, since the accumulator 500 is not in fluid communication with both the inlet and outlet of coolant pump 308, the accumulator 500 cannot be responsive to a pressure difference across the coolant pump 308 Accordingly, applicant respectfully submits that claim 1 is allowable, and this rejection should be withdrawn

Claim 3 depends from claim 1 and is allowable at least by virtue of its dependency upon an allowable base claim.

Independent claim 13 is directed to a method for controlling the operation of an x-ray tube and independent claim 19 is directed to a system for removing heat from an associated x-ray tube. Claims 13 and 19 both contain claims aspects similar to claim 1 involving a pressure difference across the pump. As such, the above discussion with respect to claim 1 applies *mutatis mutandis* to claims 13 and 19, and the rejection of these claims should be withdrawn.

Claim 14 depends from claim 13 and requires in the event that the flow rate drops below a predetermined minimum value, reducing power to the x-ray tube. The Office asserts that Richardson et al. discloses these claim aspects in ¶ [0074]. However, applicant respectfully traverses this assertion. Richardson et al does not teach or suggest these claim aspects Instead, Richardson et al discloses in ¶ [0074] details of the construction and material of diaphragm bellows 508 of accumulator 500. Accordingly, applicant respectfully submits that claim 14 is allowable, and this rejection should be withdrawn.

Claims 15 and 16 depend from claim 13 and are allowable at least by virtue of their dependency upon an allowable base claim.

Claim 17 depends from claim 13 and requires determining a thermal loading condition of the x-ray tube from the determined temperature and flow rate. The Office asserts that Richardson et al discloses these claim aspects in ¶ [0045] However, applicant respectfully traverses this assertion. Richardson et al does not teach or suggest these claim aspects. Instead, Richardson et al. discloses in ¶ [0045] that cooling system 300 preferably comprises instrumentation for monitoring the performance, and various parameters of interest such as pressure and temperature, of cooling system 300. Even if the cooling system 300 in Richardson et al. has instrumentation for monitoring pressure and temperature of the cooling system 300, this is not the same as determining a thermal loading condition of the x-ray tube from the temperature and flow rate of the cooling system. Accordingly, applicant respectfully submits that claim 17 is allowable, and this rejection should be withdrawn.

Claim 18 depends from claim 13 and requires in response to the determined thermal loading condition, controlling at least one of: operating power of the x-ray tube, operating time of the x-ray tube, selectable scan protocols, and a cooling time prior to subsequent operating of the x-ray tube. The Office asserts that Richardson et al. discloses these claim aspects in ¶¶ [0045] and [0046]. However, applicant respectfully traverses this assertion. Richardson et al. does not teach or suggest these claim aspects. A previously discussed, Richardson et al does not disclose determining a thermal loading condition of the x-ray tube from the temperature and flow rate of the cooling system. Thus, the x-ray device 100 in Richardson et al. does not in response to a determined thermal loading condition, control at least one of: operating power of the x-ray tube, operating time of the x-ray tube, selectable scan protocols, and a cooling time prior to subsequent operating of the x-ray tube Accordingly, applicant respectfully submits that claim 18 is allowable, and this rejection should be withdrawn.

Claim 20 depends from claim 19 and requires a means for measuring a pressure difference across the pump and a means for determining cooling fluid flow rate from the determined pressure difference. The Office asserts that Richardson et al. discloses these claim aspects in ¶ [0045] However, applicant respectfully traverses this assertion Richardson et al. does not teach or suggest these claim aspects. As previously discussed, the accumulator 500 in Richardson et al. is not responsive to a pressure difference across the pump 308 Thus, the accumulator 500 is not a means for measuring a pressure difference across the pump Since

there is no means for measuring the pressure difference across the pump, there is no means for determining cooling fluid flow rate from the determined pressure difference. Accordingly, applicant respectfully submits that claim 20 is allowable, and this rejection should be withdrawn.

The Rejection of Claims 2, 4-10 and 21-22 under 35 U.S.C. 103(a)

Claims 2, 4-10 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson et al. in view of Walton et al. Claims 2 and 4-10 depend from independent claim 1 and claims 21-22 depend from independent claim 19. As such, claims 2, 4-10 and 21-22 are allowable, and this rejection should be withdrawn.

The Rejection of Claims 11-12 under 35 U.S.C. 103(a)

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson et al. Claims 11 and 12 depend from independent claim 1. As such, claims 11 and 12 are allowable, and this rejection should be withdrawn.

Conclusion

In view of the foregoing, it is submitted that the claims distinguish patentably and non-obviously over the prior art of record. An early indication of allowability is earnestly solicited.

Respectfully submitted,

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